DOCUMENT RESUME

ED 301 792 CG 021 279

AUTHOR Daly, Susan S.; And Others
TITLE Multidisciplinary VA Cardiac Rehabilitation: Preliminary Results and Treatment Efficacy.
PUB DATE Aug 86
NOTE 35p.; Paper presented at the Annual Meeting of the American Psychological Association (94th, Washington, DC, August 22-26, 1986).
PUB TYPE Reports - Research/Technical (143) -- Speeches/Conference Papers (150)

EDRS PRICE MF01/PC02 Plus Postage.
DESCRIPTORS *Behavior Change; Exercise; *Heart Disorders; High Risk Persons; *Interdisciplinary Approach; *Life Style; *Older Adults; Program Effectiveness; *Rehabilitation Programs; Retirement; Veterans
IDENTIFIERS *Cardiac Rehabilitation

ABSTRACT

Initial studies have suggested that a cardiac rehabilitation program (CRP) may improve the physical and psychological functioning of participants. However, these studies have generally addressed a relatively young group of employed adult males. Three studies were designed to target an older, generally retired Veterans Administration population for rehabilitation of both their physical functioning and for modifying risk factors associated with continuing or recurrent cardiovascular difficulties. Chart review of 44 males who completed the CRP indicated that intervention produced significant positive changes in oxygen consumption, energy expenditure, and functional classification. Study 2 was a replication and extension of the first study and also indicated signficant improvement in oxygen consumption, functional classification, energy expenditure, and lipid values. Study 3 showed that completion of the program resulted in greater understanding of heart disease, and satisfaction with physical and emotional functioning. The studies support the role of a part-time CRP as an effective agent of change for the Veterans Administration population. (Author)

****
* Reproductions supplied by EDRS are the best that can be made *
* from the original document. *
****

ED301792

MULTIDISCIPLINARY VA CARDIAC REHABILITATION: PRELIMINARY RESULTS AND TREATMENT EFFICACY

Susan S. Daly, Ph.D.
Edward J. Hickling, Psy.D.
Warren R. Loos, Ph.D.
Maria Paz-Alfonso, M.D.

CS 021279

Running Head: VA Cardiac Rehab

Address for Reprints:
Susan S. Daly, Ph.D.
Psychology Service 116B
VA Medical Center
Albany, NY 12208

U.S. DEPARTMENT OF EDUCATION
Office of Educational Research and Improvement
EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC)

☑ This document has been reproduced as received from the person or organization originating it.

☐ Minor changes have been made to improve reproduction quality.

• Points of view or opinions stated in this document do not necessarily represent official OERI position or policy.

"PERMISSION TO REPRODUCE THIS MATERIAL HAS BEEN GRANTED BY

Susan S. Daly

TO THE EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC)."

ABSTRACT

Initial studies have suggested that a cardiac rehabilitation program (CRP) may improve the physical and psychological functioning of participants. However, these studies have generally addressed a relatively young group of employed adult males. Three studies were designed to target an older, generally retired VA population for rehabilitation of both their physical functioning and for modifying risk factors associated with continuing or recurrent cardiovascular difficulties. Chart review of 44 males who completed the CRP indicated that intervention produced significant positive changes in oxygen consumption (VO^2), energy expenditure (METS), and functional classification. Study 2 was a replication and extension of the first study and also indicated significant improvement in oxygen consumption, functional classification, energy expenditure and lipid values. Study 3 showed that completion of the program resulted in greater understanding of heart disease, and satisfaction with physical and emotional functioning. The studies support the role of a part-time CRP as an effective agent of change for the VA population. A description of the Albany VA Cardiac Rehabilitation Program and discussion of problems associated with risk factor modification is included.

Key Phrases: Cardiac Rehabilitation; Risk Factor Modification, Cardiac Lifestyle Modification, Exercise, Psychological Benefits

ACKNOWLEDGEMENTS

The authors wish to acknowledge Dan Byron for his assistance in data collection and providing information about the program, and Kurt Euller, and Christine Dow for their assistance in data management and analysis. The authors gratefully acknowledge Sandie Clemente for assistance in typing and manuscript preparation.

Despite an apparent decline in the incidence of cardiovascular death over the past decade, heart disease is a leading cause of morbidity and mortality in the United States. (1) Recent study attributed much of the decline in ischemic heart disease mortality more to changes in lifestyle, (lipid changes, smoking cessation, weight loss and exercise) than to special medical intervention (2). While the resources for acute care of myocardial infarction (MI) patients are highly developed, little has been available in the way of rehabilitation for these patients.

Most of the existing cardiac rehabilitation programs focus on physical exercise alone. Results have been equivocal. Froelicher (3) noted unsubstantiated physical, psychological, and social benefits of exercise alone. Whereas Oldridge and Guyatt (4) have reported a 30% to 35% lower mortality rate in cardiac patients assigned to exercise programs.

Numerous cardiovascular heart disease (CHD) risk factors, (obesity, smoking, anxiety, Type-A behavior, and stress) as well as the emotional and social functioning of cardiac patients are ignored by many programs. Waltz (5) has reported that one third of MI patients experienced significant physical and psychological problems and were recovering poorly after one year. Extreme Type-A patients (measured by Jenkins Activity Survey) experienced the most

cardiac symptoms and social disability in this study. Ruberman, Weinblatt, Goldberg, and Chaudhary (6) reported a mortality rate four times greater in socially isolated cardiac patients who experienced higher levels of life stress as compared with cardiac patients who exhibited adequate social functioning. CHD risk factors and the psychosocial sequelae of MI described by Waltz, (5) and Ruberman et. al. (6) share cognitive and behavioral factors amenable to psychological interventions.

To date psychological interventions with cardiac patients have demonstrated (a) change in Type-A behaviors (7,8), (b) behavioral reactivity but not physiological reactivity (9), and (c) decreased anxiety, depression, and anger and increased vigor, none of which correlated with improved physical performance (10). In two controlled studies, cardiac patients experienced fewer episodes of congestive heart failure and supraventricular arrhythmias, and experienced a more positive social orientation with normal levels of activity after 4 months (11), and decreased mortality/morbidity (12,13). Thoresen, et. al. (7) reported a 7.2% re-infarction rate in patients receiving behavior treatment for Type-A behavior pattern (TABP) vs a 13.2% re-infarction rate in patients receiving cardiologic group treatment alone.

There is a growing body of literature which demonstrates

the positive contributions of multifaceted cardia rehabilitation programs to the cardiovascular and psychological functioning of successful participants. Lovibond, Birrell, Langeluddecke (14) reported reductions in weight, blood pressure, serum cholesterol and overall CHD risk, with improved aerobic capacity, over 12 months, in high CHD risk subjects who underwent three variations of behavioral therapy aimed at reducing multiple CHD risk factors. Cardiac patients in rehabilitation programs have reliably demonstrated more efficient cardiovascular functioning, improved compliance with treatment recommendations, more positive self esteem and better psychosocial functioning (15).

Moreover, Smith, Layton, Newmark & Diethrich (16) have demonstrated the positive effects of an 8 week multifaceted cardiac rehabilitation program on patients with severe, inoperable coronary artery disease and disabling symptoms. An average weight loss of 16 lbs. over two months, a reduction in cholesterol by 16.4%, in LDL-cholesterol by 13%, and in triglycerides by 45% was reported. Change in HDL-cholesterol was not significant, but significant change was observed in VLDL-cholesterol, and in the cholesterol/HDL-cholesterol, and LDL/HDL ratios. Treadmill time increased with consequent increased estimated VO2 max, and reduced frequency of anginal pain, and use of nitroglycerin. The time to onset of S-T segment change of one millimeter or

greater was delayed 126%. Smith et. al. did not report data regarding psychosocial function, however, despite the inclusion of weekly psychological counseling during the 8 week program.

While the available cardiac rehabilitation literature is promising, most research has focused on a relatively younger, working population. These results may not be applicable to an older, generally retired, VA population with multiple medical problems.

Although the VA has established a model cardiac rehabilitation program in Milwauke, WI(17), and supports another program in Albany, NY (18) thus demonstrating a need for cardiac rehabilitation in the VA system, there has been no systematic evaluation of the effectiveness of such programs. This paper describes the Cardiac Rehabilitation Program at the Albany-VAMC, and reports 3 studies designed to measure the outcome of patients undergoing rehabilitation. Change in overall physical activity levels and in coronary heart disease risk factor status was assessed during participation in the program. Study goals were to: (1) demonstrate that a comprehensive cardiac rehabilitation program can be effective with a VA> population; (2) establish the efficacy of a multidisciplinary approach to cardiac rehabilitation; (3) demonstrate an innovative use of available hospital services and professional skills in a

manner that is consistent with the current methods and resources of many hospitals, in contrast to "model programs", and (4) demonstrate pragmatic program evaluation methods utilized in an innovative V.A. program for this special population.

PROGRAM DESCRIPTION: The Cardiac Rehabilitation Program (CRP) at the VAMC Albany is a 10 week, comprehensive program which includes staff members from psychology, physiatry, corrective therapy, nursing, social work, dietetics and recreation therapy. This multidisciplinary program targets rehabilitation for patients in both their overall physical activity levels and in modifying risk factors associated with continuing or recurrent cardiovascular difficulties.

The program's objective is to restore cardiac patients to an enjoyable and productive life within the limits of their heart disease. This is accomplished through (1) education of patients and families about the pertinent aspects of heart disease, (2) identification, correction or modification of risk factors, (3) improvement of psychosocial factors influencing the development of and recovery from heart disease, (4) structured, progressive physical activity to promote physical and cardiovascular fitness, and (5) counseling for adjustment to disability or return to work. Group sessions are held three times per week for both

exercise and risk factor modification. In addition, individual intervention for any targeted risk factor or concern may be provided as needed.

Entry into the program occurs following referral by Cardiology Service. All participants receive an initial medical evaluation which includes a history, physical exam, assessment of risk factors and baseline lab tests including cholesterol and triglycerides, ejection fraction, blood pressure and weight. Patients are asked to complete a pre-treatment assessment test battery which includes the Framingham Type A scale(19), the Glaser Stress Control Survey (20), the Beck Depression Inventory (21), the State Trait Anxiety Inventory (22), and the Symptom Checklist 90-R (23). In addition they complete the Cardiac Rehabilitation Program Questionnaire (CRPQ) which elicits demographic information and asks questions concerning marital and significant relationships, family history of heart disease, the individual's understanding of his heart disease and cardiac problems, current medications and other medical programs, sleep patterns, ETOH use, smoking, blood pressure, pain complaints, level of stress and stress management techniques, exercise routine, vocational status, and patient ratings of physical and emotional satisfaction.

THE EXERCISE PROGRAM: One of the major goals of the CRP is

to improve and maximize the physical functioning of the participants. Individualized exercise programs are prescribed following a comprehensive evaluation. In order to achieve optimal physiological benefits, patients are expected to exercise up to 80-85% of actual target heart rate, or about 70% of VO2 max as determined by the stress test. The CRP uses a 20 minute or 30 minute Endurance Phase (see Table 1) for execution of the exercise prescription. Patients are seen for group exercise three times each week for a ten week period of time. Exercise typically includes a warm-up period, calisthenics, bicycle ergometer, weighted pulleys, arm ergometer, treatmill and cool down period. Exercise is varied to provide both upper and lower body activities, and to sustain the interest of the participant while maintaining a targeted heart rate. A cool down period follows each exercise group. A prescribed walking/exercise program is instituted during the course of the 10 week program. Continuation of the walking program is encouraged after completion of the program in an effort to expand and maintain the progress each participant has made by the end of the hospital-based program.

LIFESTYLE MODIFICATION: Risk factor modification is addressed through group and individual counseling sessions. Group sessions are scheduled immediately following each exercise session, and emphasize lifestyle change and risk

factor modification, education about heart disease, and supportive counseling. Topics for the hour-long meetings can be found in Table II. Spouses and family members are encouraged to attend the group sessions and are specifically invited to attend sessions dealing with diet, the effect of heart disease on the family, and problem behaviors such as overeating or smoking. All groups are led or facilitated by a psychologist.

A multidisciplinary team approach is used, and invited speakers include a social worker, dietitian, recreation therapist, nurse, physician and corrective therapist. Teaching methods include lectures, audiovisual materials and group discussions.

Several group discussion sessions are scheduled during the course of the program. These sessions are led by the psychologist and are designed to assist participants in dealing with their feelings and fears related to heart disease. An emphasis is placed on dealing with the loss of personal roles, adjustment to lifestyle changes and developing a supportive group atmosphere which fosters individual growth and positive change. These sessions also offer an opportunity to reinforce positive health behaviors and identify participants who amy need individual psychotherapy.

Participants who desire assistance in modifying specific risk factors may also be seen on an individual basis. For example, an individual may be seen for individual sessions by the psychologist for help with cigarette smoking cessation, or if appropriate they may be referred to the hospital's smoking cessation clinic. Biofeedback training, relaxation training and individualized stress management is also available for appropriate participants. Lastly, for participants who have a significant weight problem, weekly meetings held jointly by the psychologist and dietitian are available.

STUDIES

Data was collected from a total of 81 patients who participated in the Cardiac Rehabilitation Program. Study 1 was a retrospective chart review which analyzed physiological improvement in 44 male veterans. Study 2 replicated and extended of the first study using 19 patients. Study 3 examined change in cardiac risk factors and psychological variables in 18 patients.

SUBJECT POOL: Subject pool for the 3 studies consisted of 79 male and 2 female veterans with a mean age of 60.21 years (range 38-76 years), and an average education level of 11.6

years (range 6-23 years); 52 subjects were married, 9 divorced, 4 separated, 4 widowed and 10 were single, 38 subjects were retired. Subjects reported taking an average of 3.9 medications (range 0-13).

Each subject completed pretreatment and post-treatment assessment batteries which included the Beck Depression Inventory (BDI) (21), the State Trait Anxiety Scale (STAI) (22) a Self jControl Scale (SC) (24) and the Albany Cardiac Rehabilitation Program Questionnaire (ACRPQ), a questionnaire developed by the Program to assess coronary heart disease risk factors, and gather background data. It included Likert-type scales of self reported ratings of physical and emotional functioning and stress levels. Self reported risk factors included: family history of heart disease (44 yes, 27 not, 10 unknown); abnormal cholesterol levels (24 yes, 20 no, 5 unknown) and diabetes (11 yes, 66 no, 4 unknown). Twenty people continued to smoke. The average number of smoking years for the entire group (smokers and quitters) was 27.91 (range 3-55 years) and the average number of years since quitting was 6.5 (range 1-34). Sedentary lifestyle was measured by number of different types of exercise.

Subjects reported a mean stress rating of 4.81 (range 0-10) and indicated a low degree os satisfaction with their physical functioning (mean 3.78, range 0-10) and a somewhat higher degree of satisfaction with their emotional

functioning (mean 6.10, range 0-10). Forty subjects reported sexual dysfunction problems.

STUDY 1

METHOD

Study 1 consisted of a random retrospective review of charts for 44 male participants who completed the cardiac rehabilitation program between May 1981 and May 1985. Twenty-one of the participants had undergone coronary bypass graft surgery (CABG). For purposes of comparison, a separate analysis was performed using 21 of the subjects in the sample who had not undergone surgery. The mean age of the patients studied was 59, with an age range from 48-79. Pre and post treatment measures consisted of New York Heart Association Functional Classification ratings (NYSHAFC) (see Table III), ratings of maximum oxygen consumption (VO2), and energy expenditure as measured in metabolic equivalents (METS).

RESULTS

Significant improvements were found on all treatment measures. Of the 42 patients studied, 35 (77%) demonstrated

improvements in NYSHAFC functional classification, 9 remained at the same level (23%), and none (0%) worsened. These changes across treatment were significant ($x^2(df3)=37.052$ $p<.001$) (see Table IV). Significant change was found on mean pre-treatment to post-treatment MET scores ($t(42)=14.99$ $p<.001$) and on mean pre-treatment to post-treatment VO2 scores ($t(42)=15.78$ $p<.001$). Presence or absence of CABG did not affect overall improvement (see Table V).

STUDY 2

To replicate study 1, 20 new patients were sampled retrospectively upon completion of the CRP. All 20 patients studied showed significant improvements in the New York State functional classification $x^2(df2)=19.29$ $p<.001$) and CR fitness $x^2(df4)=19.89$ $p<.001$). For further information please see Table VI. Significant improvement was also replicated from pre-treatment to post-treatment MET scores ($t=5.30$ $p<.005$) (Table VII). The average increases across treatment ranged from a mean of 4.8 METS (pre-treatment) to 7.55 METS at the end of 10 weeks of treatment. Estimated VO2 scores also showed significant improvement ($t=5.28$ $p<.0005$) with pre-treatment means of 16.95 increasing to 26.65 at the end of treatment (Table VIII). The replication study further

demonstrated significant change in cholesterol levels over a 10 week period. Total cholesterol showed a significant drop ($t=1.81$ $p<.05$) as did LDL changes ($t=1.81$ $p<.05$) and HDL gains ($t=2.78$ $p<.005$). See Tables IX-XI for treatment change summaries. The unequal N is reflective of missing data.

DISCUSSION

The primary conclusions to be drawn from study 1 and 2 are as follows: first, this cardiac rehabilitation program produced significant improvements in cardiovascular status of the patients reviewed. This is evident from the highly significant change in metabolic equivalents and rate of oxygen consumption as a result of rehabilitation. The significant changes in functional classification also support this conclusion.

Second, given the lack of association between improvement in cardiac capacity and CABG surgery and number of risk factors, it appears that this treatment program is effective despite variations in initial cardiac status. This provides support for the overall effectiveness of the program.

In summary, from a physiological standpoint, it is clear from the data presented that the cardiac rehabilitation

program was effective in improving cardiovascular capacity and fitness.

STUDY 3

METHOD

Study 3 was a prospective study of 18 male veterans who completed the CRP. Mean age was 58.1 years, with an average education level of 11.3 years. Fifteen of the subjects were married, 2 were separated, and 1 was widowed. Average self-reported onset of CAD was 5.35 years. There were fourteen potential risk factors assessed within the program (see Table XII). Subjects had between 2-7 risk factors, with an average of 5.

Each subject completed pre-treatment and post-treatment assessment batteries which included the following: The Jenkins Activity Survery (JAS), Beck Depression Inventory (BDI), Multidimensional Health Locas of Control (MHLOC), the Hopkins Symptom Checklist (HSCL), the State Trait Anxiety Scale (STAI), and the Albany Cardiac Rehabilitation Program Questionnaire (ACRPQ). Post-treatment measures were gathered at the completion of the 10 week program.

RESULTS

As measured by the ACRPQ, subjects reported a significantly greater understanding of coronary artery disease $T(16)=5.15$ $p<.05$; and greater satisfaction with physical functioning $T(16)=2.55$ $p<.01$; and emotional functioning $t(16)=3.32$ $p<.01$. At the end of the tenth week the HSCL demonstrated significant improvements on the mean total scores $T(15)=2.57$ $p<.05$, agitated depression scores $t(15)=2.24$ $p<.05$, interpersonal sensitivity $t(15)=2.67$ $p<.05$ and somatization $t(15)=2.18$ $p<.05$. Other HSCL subscales failed to show any significant change (see Table XIII). There were no significant changes found across treatment for the BDI, STAI, or MHLOC scores. The ACRPQ failed to show significant changes on measures of self-reported ability to handle stress, number of different physical exercises, sleep, blood pressure, weight, pain or smoking cessation, although trends for improvement were noted in several of these categories (see Table XIV). Post JAS scores were not analyzed due to the large number of subjects who were unemployed, and consequently invalidated the test scores.

DISCUSSION

The Cardiac Rehabilitation Program is staffed by a part-

time multidisciplinary treatment team, designed to treat the special needs of a select, aging veteran population. The program has dmonstrated significant improvements on a number of important physical, educational and emotional factors. However, a number of critical risk factors namely weight, smoking, stress management and exercise have continued to resist sustained intervention. There are several factors which may be influencing this apparent lack of movement in the desired direction. One explanation lies in the measurement techniques used. Although the JAS is a valid measure of type A behavior, its use was inappropriaate with this group of mostly retired males, because many of the questions address work related behavior. In terms of exercise, we asked participants to indicate the number of different types of exercise they engaged in which does not appear to accurately reflect what is most important, i.e. the performance of regular and sustained exercise. Consequently, while clinically the veterans were seen as improved and reported regular exercise, they reported only one form of exercise, and hence the result in our study. We have continued to refine the assessment of risk factors. Questions regarding demographic variables have been clarified and measures of psychosocial factors (hostility, hardiness) and type A behaviors (Framingham, Bortner) have been included.

Second, some risk factors appear to take longer to

change than others, particularly given the average number of risk factors found in our population. Smoking is one such example: of the five patients who smoked in our study, two quit after the ten week program with continued intervention from the psychology staff. This was not reflected in the ten week data. It seems reasonable in our older, more resistant population, not to expect them to be able to change everything at once.

Finally, the program design itself may have contributed to the negative results. Although there was an emphasis on diet and weight loss, the lack of weight loss has prompted some program changes. An increased number of diet classes, a more concerted team approach to weight loss, greater behavior interventions by the psychology staff, and an incentive program have resulted in a significant weight loss for recent participants.

The VAMC Albany CRP is felt to be a different type of program than is available in funded programs elsewhere in the VA system. The Albany CRP has been assembled by totally internal resources, through part-time staff involvement grated by each service. This we believe is more reflective of the true situation in the VA system. The program has demonstrated an ability to identify and modify many significant risk factors in the aging veteran population, which in these days of limited funding is increasingly

difficult.

TABLE I

STUDY I

20' ENDURANCE PHASE	30' ENDURANCE PHASE
2' Calisthenics (warm-up)	2' Calisthenics (warm-up)
2' Stationary Bicycle (warm-up)	2' Stationary Bicycle (warm-up)
5' Bicycle Ergometer/Treadmill	10' Bicycle Ergometer/Treadmill
4' Rest period	4' Rest period
5' Bicycle Ergometer/Treadmill	10' Bicycle Ergometer/Treadmill
4' Rest period	4' Rest period
5' Arm Ergometer	5' Arm Ergometer
4' Rest period	4' Rest period
5' Rowing Machine	5' Rowing Machine
2' Stationary Bicycle (cooldown)	2' Stationary Bicycle (cooldown)

TABLE II

STUDY I

CARDIAC REHABILITATION PROGRAM (CRP)
RISK MODIFICATION GROUP SCHEDULE
VA MEDICAL CENTER - ALBANY

Group Leaders and Moderators: Psychology Service

SESSION	TOPIC	SPEAKER/LEADER
1	Introduction and overview	Psychologist
2	CRP, Education and Exercise	Corrective Therapist
3	Medical Aspects of Cardiac Rehabilitation	Physiatrist
4	Nursing Aspects of CRP	Registered Nurse
5	Diet and Heart Disease (Couples Attendance at this meeting)	Dietitian
6	Group Discussion	Psychologist
7	Impact of Heart Disease on the Family (Couples attendance at this meeting)	Psychologist
8	Group Discussion	Psychologist
9	Problem Behaviors (Overeating, smoking and more) (Couples attendance at this meeting)	Psychologist
10	Type A Personality and Stress Management	Psychologist
11	Group Discussion	Psychologist
12	Planning for the Future	Social Worker
13	Leisure Activity and Community Resources	Recreation Therapist
14	Graduation	All staff

TABLE III

STUDY I

NEW YORK HEART ASSOCIATION

FUNCTIONAL CLASSIFICATION

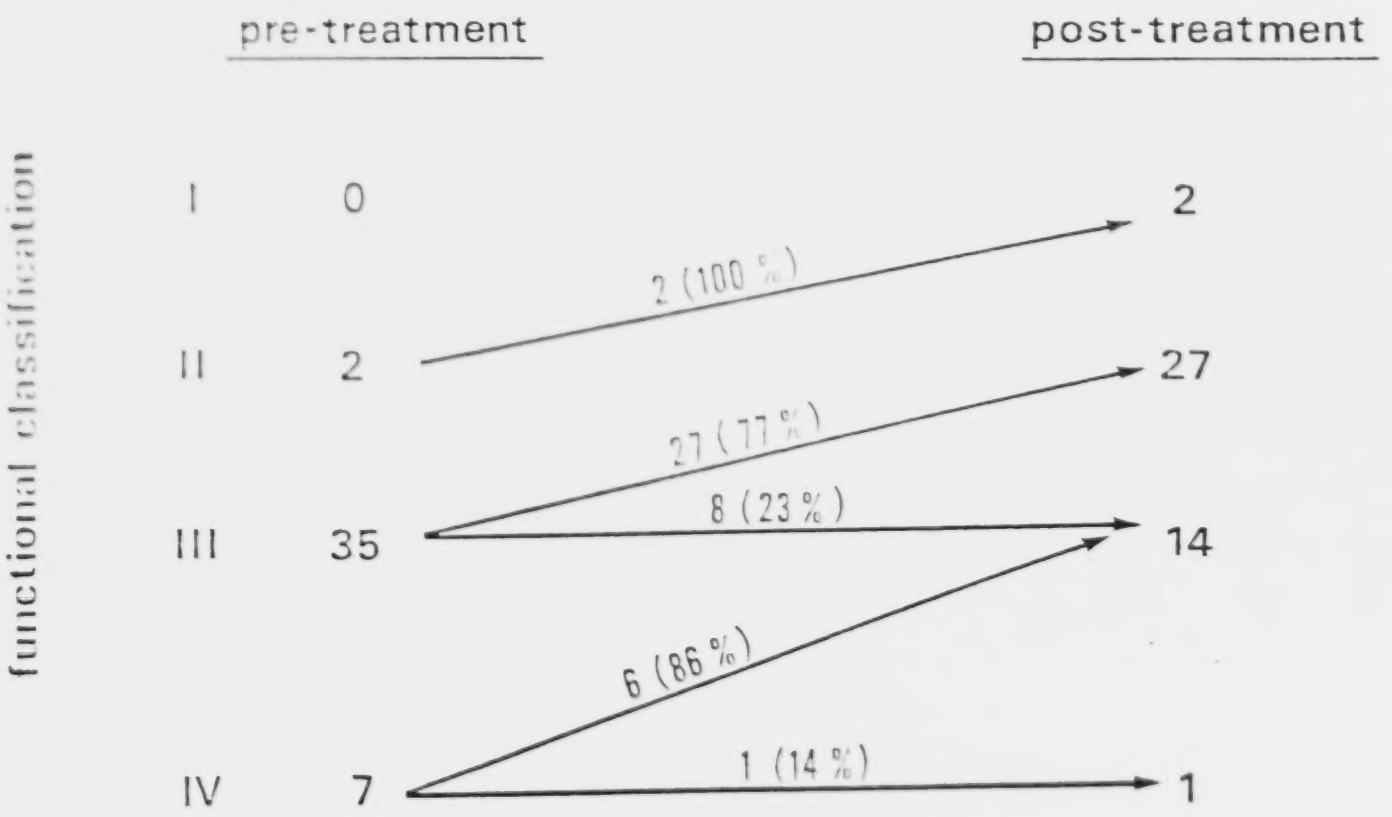
CLASS I: Patients with heart disease who have no symptoms of any kind. Ordinary physical activity does not cause fatigue, palpitation, dyspnea or anginal pain.

CLASS II: Patients who are comfortable at rest but have symptoms with ordinary physical activity.

CLASS III: Patients who are comfortable at rest but have symptoms with less than ordinary effort.

CLASS IV: Patients who have symptoms at rest.

CHANGES IN FUNCTIONAL CLASSIFICATION FROM PRE-TREATMENT TO POST-TREATMENT



NUMBER OF PATIENTS = 44

TABLE V

STUDY I

MEAN PHYSICAL CHANGES ACROSS TREATMENT

	METABOLIC EQUIVALENTS			OXYGEN CONSUMPTION		
Group	Pre	Post	Change	Pre	Post	Change
CABG N=21	3.452	6.380	+2.928	.809	1.580	+.771
No CABG N=21	3.119	6.452	+3.340	.709	1.609	+.900
Combined N=42	3.428	6.416	+2.988	.759	1.595	+.836

CABG = Coronary Artery Bypass Graft
No CABG = No surgery

STUDY 2

FUNCTIONAL CLASS & CR FITNESS CHANGES

Functional Class.

	pre	post
1	0	12
2	11	7
3	9	1

$\chi^2_{df=2} = 19.29$.

$p < .001$

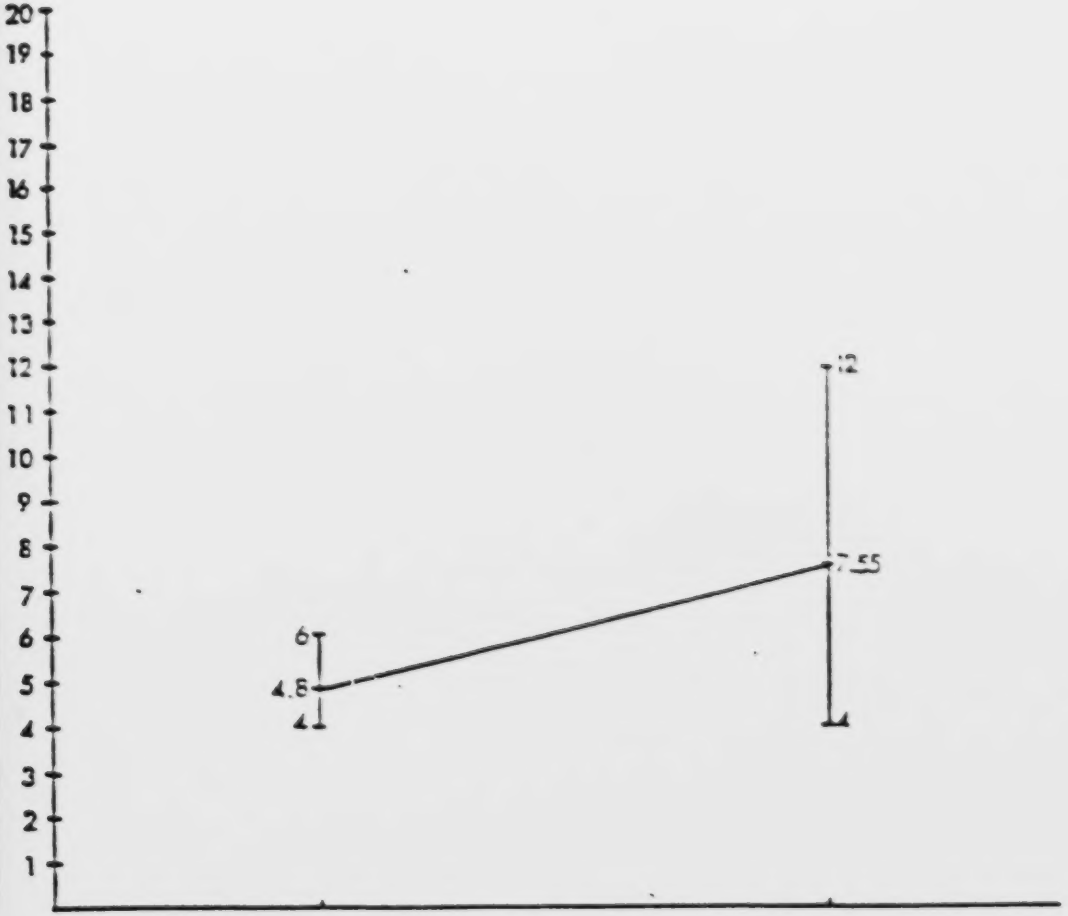
CR Fitness

	pre	post
low 1	10	1
fair 2	10	7
average 3	0	7
good 4	0	4
high 5	0	1

$\chi^2_{df=4} = 19.89$

$p < .001$

Mets - 10 wk tx



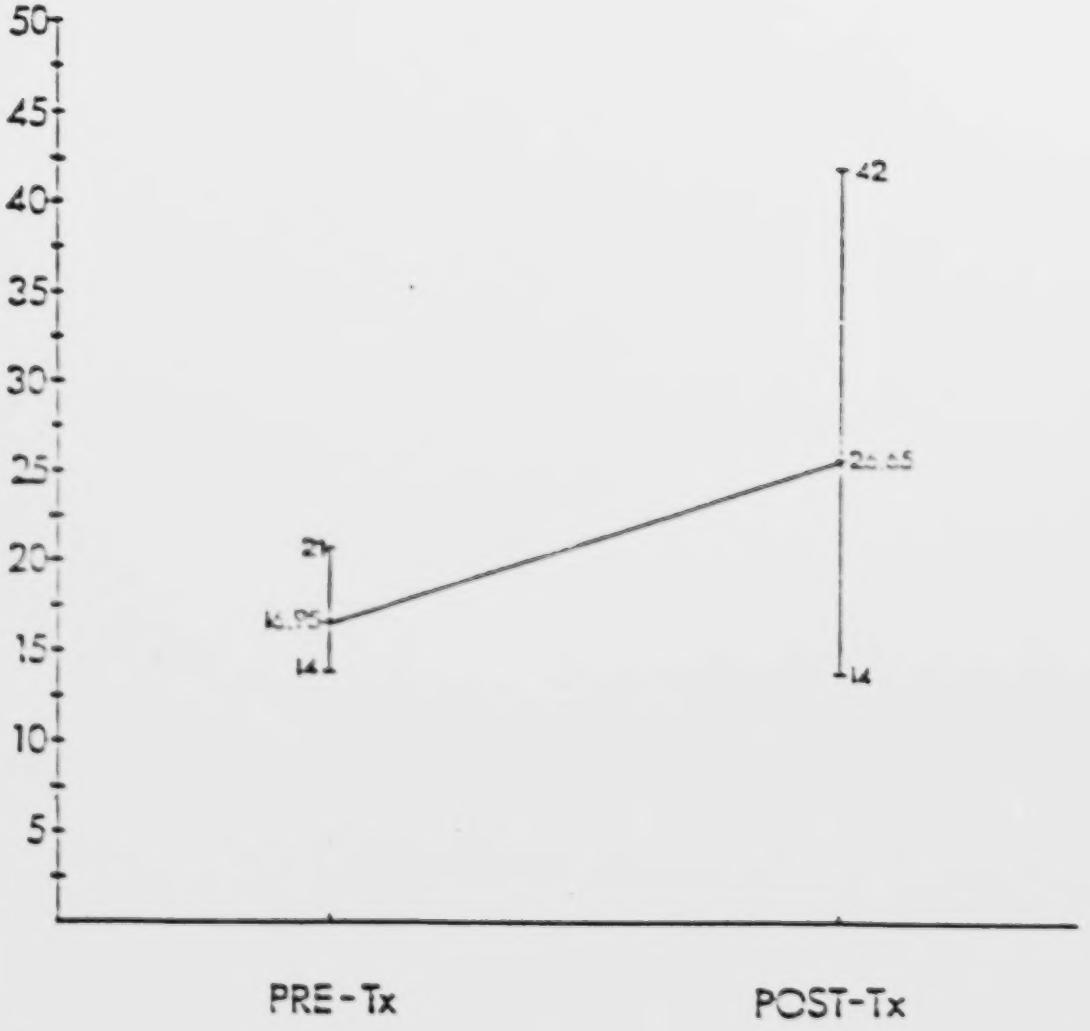
N= 20

t = 5.30

P ∠ .0005

STUDY 2

VO_2 - 10wk tx



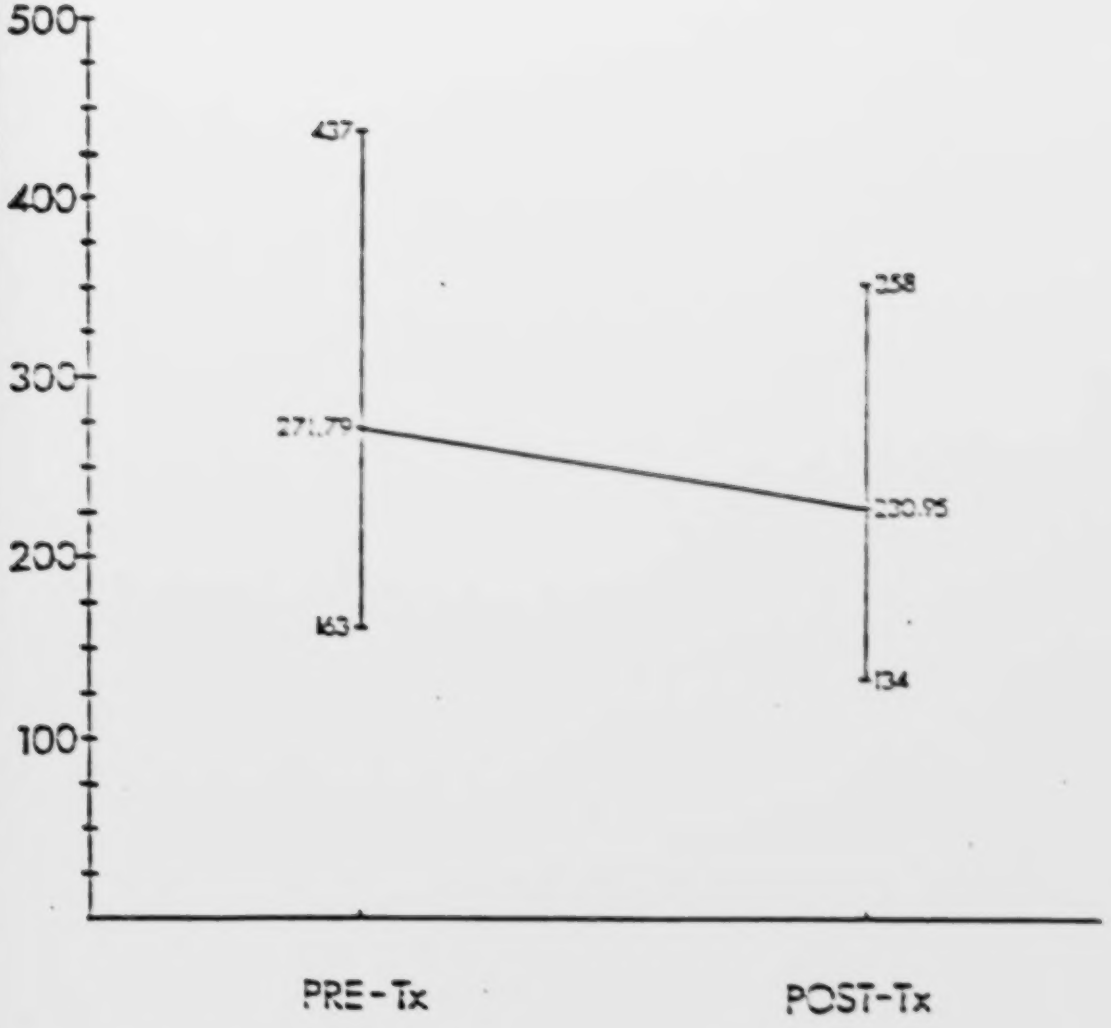
N=20

t=5.28

P < .0005

STUDY 1

CHOLESTEROL - 10 wk tx

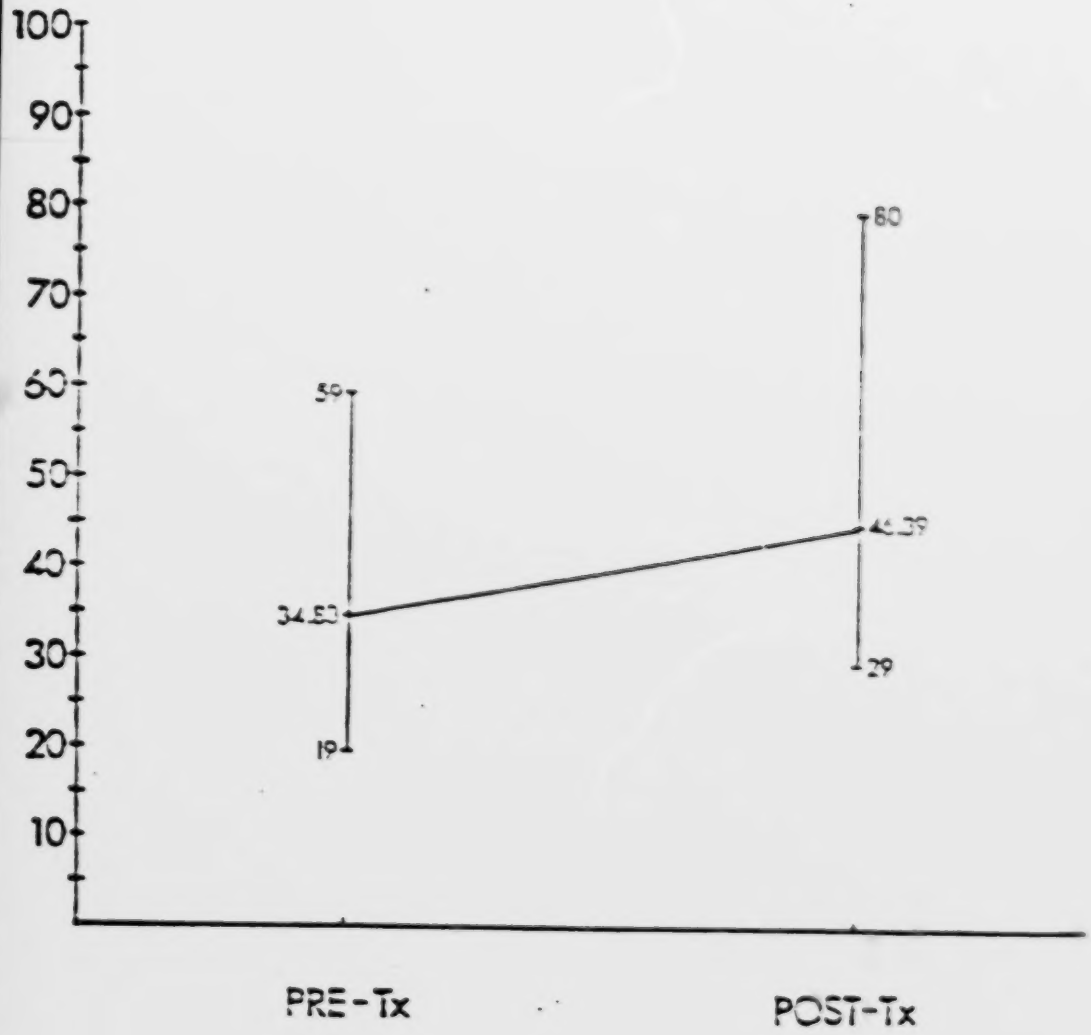


N = 19

t = 1.81

P < .05

Hdl -10 wk tx

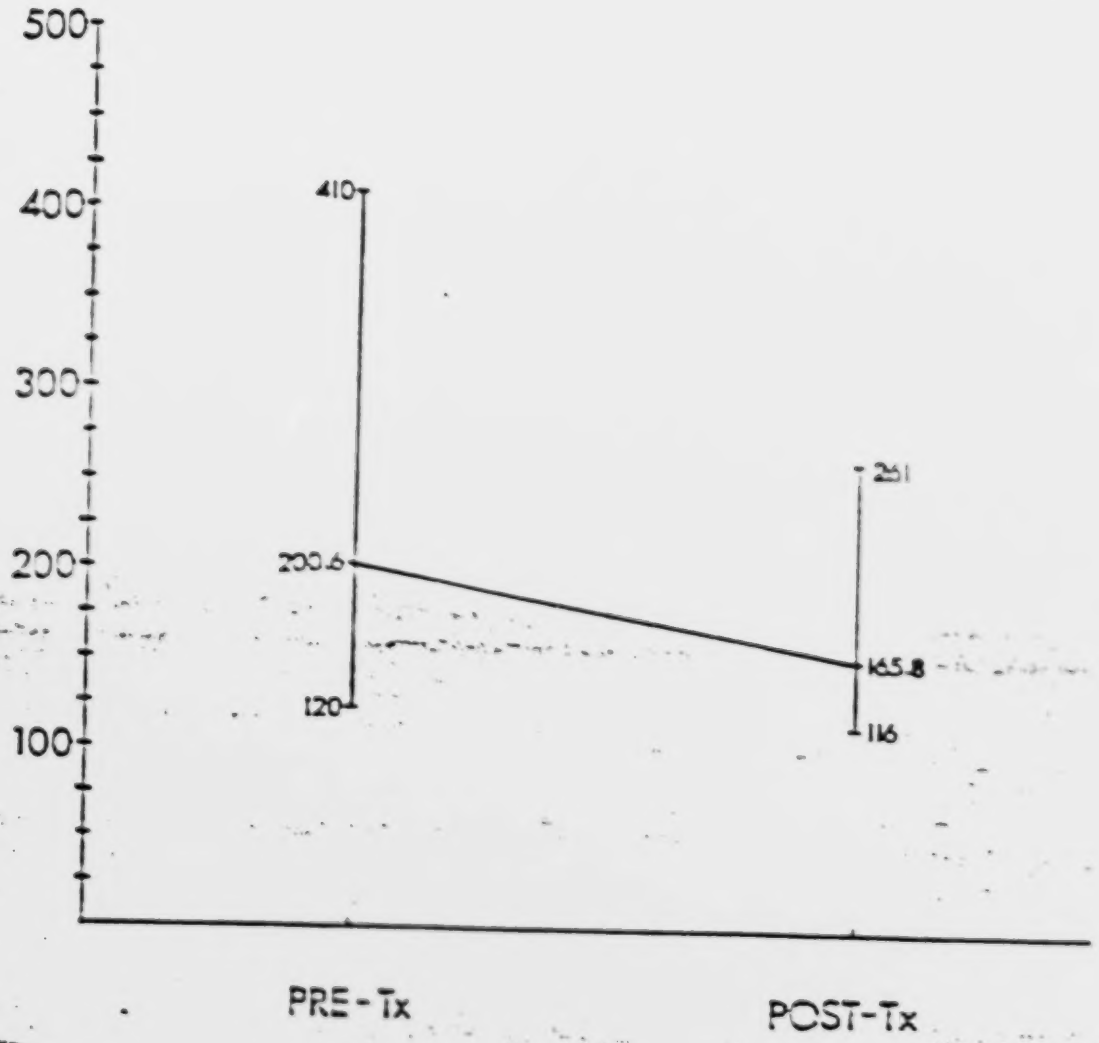


N=18

t = 2.78

P < .005

Ldl-10 wk tx



N = 18

t = 1.81

P < .05

TABLE XIII

STUDY 3

HOPKINS SYMPTOM CHECKLIST
MEAN RAW SCORES ACROSS TREATMENT

SUBSCALE	PRE	POST	t	ALPHA
Interpersonal Sensitivity	10.94	9.56	2.667	p<.05
Phobic anxiety	14.62	13.31	1.167	n.s.
Retarded depression	24.25	23.00	1.091	n.s.
Anger-hostility	20.25	19.00	1.212	n.s.
Somatization	33.62	29.75	2.175	p<.05
Obsessive compulsive	10.94	10.25	1.090	n.s.
Agitated depression	19.31	16.81	2.236	p<.05
Psychoticism	10.94	10.50	.499	n.s.
Total Score	144.88	132.19	2.568	p<.05

N = 16, df = 15